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ANNUAL REPORT

OF THE

GOVERNMENT BOTANIST AND DIRECTOR OF THE
BOTANIC GARDEN.

PRESENTED TO BOTH HOUSES OF PARLIAMENT BY HIS EXCELLENCY'S COMMAND.

By Authority:

JOHN FERRES, GOVERNMENT PRINTER, MELBOURNE.

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REPORT.

Melbourne Botanical Garden,
30th September, 1865.

SIR,

I have the honor of submitting to you a General Report on the more recent labors performed in the Botanical Garden, and in the Museum connected with this establishment.

The Yarra flood of October, 1863, had left the lower garden area in a state of such extensive devastation, that ever since a large share of labor available in the department was absorbed, not merely in the restoration of the ground and its plantations, but also by the adoption of such measures as will tend to obviate the recurrence of similar disasters. It became thus necessary to raise the Yarra bank along the whole line of the Garden, generally to the extent of several feet, and this work could even by this time not have been accomplished without a special vote, had not the drought of last summer and autumn laid dry the marginal portion of the lagoon and facilitated the removal of many thousand loads of soil of the river banks to the lower part of the bridge walk, and to the depressed portion of the borders facing the south side of the lake.

By levelling of the flood débris, and by distributing over it the soil from the adjacent excavations, I caused the north-eastern swampy portion of the lake to be transformed into a lawn, accessible especially to boat parties as picnic ground. Fern trees, Bamboos, Dracænae, New Zealandian and hardy Australian palms, as well as other plants, imparting to the landscape a somewhat tropical feature, have been grouped at the adjoining edge of the lake within the spontaneously growing Melaleuca jungle. Also a good sized bower of rustic workmanship has been erected on the spot. The scattering of some umbrageous trees over this new lawn, and the construction of a frond house of tall American Arbor Vita, will complete the main improvements of this part of the Garden. Having seen a structure such as indicated, one of exquisite beauty and refreshing coolness, in the Imperial Garden of Rio Janeiro, I have striven to provide the necessary plants of this Thuaia. Perhaps other coniferous trees with a tendency to lateral growth might be chosen for kindred purposes.

In many parts of the Garden iron bowers, set in basalt blocks, and thus of long lasting durability, have been provided: indeed these, together with the long extent of iron fences fixed to basaltic foundation stones, and the numerous lines of glazed drain-pipes, must be regarded as among the permanent property of the Garden.

A good many of the walks are now edged with brick or tile gutters; still, as our grounds are mostly lying on declivities, much additional work needs yet to be done for carrying readily off the water after heavy rainfalls.

By the extension of the system of the Yan Yean waterworks to South Yarra during the last year, the boon of inexpensive water supply through gravitation came at last within our reach.

Iron pipes, of 3 inches diameter, extend now from the upper eastern part of the Garden to the summit of the rise beyond the north-western limits of our ground. From hence I was enabled to conduct the water in open channels along the slopes towards the Yarra and the City bridge, through nearly the whole length of the Government House

reserve. An arrangement is under progress to provide a second main pipe of the aqueducts, in order that the tree plantations in the special reserves of the Botanic Garden, and in that part of the Government House domain inclining to the St. Kilda road, may enjoy already this summer a similar benefit of irrigation. In the last-mentioned reserves, not only extensive lines of avenue trees have been arrayed along the walks more recently laid out, but also the grassy undulations and slopes have widely and permanently been planted with Firs and other coniferous trees, and with Mediterranean and American Oaks, many evergreen.

The means for these extensive operations on the grounds also beyond the garden area have been exclusively supplied from the votes of this department. The kinds of trees chosen, and the number planted, are indicated on the attached plan. Thus, the lines of avenues now established in the Garden and in the surrounding reserves comprise the following 42 kinds of trees: the Illawarra Flame tree, the Poplar-Bottle tree, *Pithecolobium pruinosa*, the British Birch, *Grevillea robusta*, *Gleditschia*, the Sugar Maple, the Sycamore Maple, *Ailantus glandulosa*, the Azedarach or White Cedar, the spreading Black Poplar, the Abele Poplar, the Moreton Bay Fig tree, *Hymenoporus flavum*, the British Elm, the Bluegum tree, the Stringybark tree, the West Australian Redgum tree, the Cork Oak, *Pawlonia imperialis*, the columnar and the spreading Mediterranean Cypress, the tall *Cupressus macrocarpa* and *Cupressus Lawsoniana* of California, the Himalayan *Cupressus torulosa*, the Halepo Pine, the Stone Pine, the Japan Gingko, the Wellingtonia or Big tree, the Bunya Bunya tree, the Canary Islands Fir, *Pinus excelsa* from the Indian Highlands, the Deodar Cedar, the Walnut tree, the Weeping Willow, the Locust tree, the true Plane, the North America Wax Ash, and *Pinus insignis* of California.

The three last-mentioned kinds have shown such a celerity of growth that I cannot refrain from drawing special attention to their superiority over very many other eligible avenue plants. Thus *Pinus insignis* has grown here with about twice the rapidity of a Cluster pine, and thrice that of a Scotch Fir. Planes and Wax Ashes, if once established, could be multiplied locally with the greatest ease from cuttings.

Irrespective of these kinds, a number of miscellaneous trees of deciduous foliage, including Horse Chesnut trees, Sweet Chesnut trees, Limes, &c., are mingled with the evergreen tree vegetation on the causeway at the Yarra banks. Some additional lines of trees are projected on the northern reserve, and for these may be chosen such superior species as the Sycamore Fig tree, which is the favored tree along roadsides and around dwellings in Egypt, where single lines of this tree are found sufficient to overshadow broad streets with its expansive ramifications.

As further eligible for avenues may be mentioned the Lemon-scented Eucalyptus, the Karri Gum tree of West Australia, next to Wellingtonia probably the most gigantic tree of the globe; the *Cardwellia sublimis* and other noble trees recently discovered in the jungles of the north-east coast, and probably hardy here; especially also the Manna Ash, which has proved here, as might be expected from its South European origin, much less susceptible to the effects of scorching winds than its middle European congener; further, *Azadirachta* trees, the *Siris Acacia*, *Amyris terebinthifolia*, several North American trees, especially from the southern states, some here already under test of experiment; the Chinese evergreen Elm, the Basket Willow, Oranges, several kinds of true Oaks, *Cupressus Goveniana*, the most rapid and at the same time perhaps the most spreadingly growing of all lofty Cypresses; *Flindersia* trees of several kinds; several *Elæocarpi*, hardy and of tall growth, especially *Elæocarpus holopetalus* of East Gipps Land, and of the southern part of New South Wales; perhaps also *Eucryphia Moorei*, and other trees, such as continued and successive trials may point out as adapted to our clime.

And here the prospects are most cheering. For, with due regard to aspect, soil and shelter, we may select for overshadowing our roads and streets from an almost endless number of kinds of tree within the broad girdle of the whole temperate and also the sub-

tropical zone. And let it further be remarked, that in some states of middle Europe for many years past public roads have been lined with the ordinary fruit trees of our gardens, an example well worthy of imitation in every other adapted part of the globe, since this measure has become not merely a boon to wayfarers but also a source of a lasting revenue.

The total number of avenue trees, which have found a permanent place within the special area of the Botanic Garden, amounts now to 1,230; that of the southern domain, to 1,429; that of the northern ground, to 162; that of the Government House reserve, to 1,656. Besides, between the Garden Bridge and the next railway station, lines of elms are planted. Thus the total number on the grounds under my control amounts to 4,443. The incipient pineta, formed on our ground, are still more important. On the lawns around the Palmhouse, already a collection of 185 kinds exists; this number represents, however, not all species in our possession, since many additional kinds are scattered through the Garden.

On the slope facing the lagoon, 306 pines are planted, amongst which the predominant *Araucariæ* have assumed already a magnificent appearance. From these groups of coniferous trees the young pine forests are uninterruptedly extended for future handsome groves over the Yarra slopes to the City bridge, and from thence again over the brow of the hill facing the St. Kilda road, and continued by young copses of Mediterranean firs along the Domain road. In the Government House reserve alone, 7,342 pines or pine-like trees are planted. Added to these, 1,299 Conifers planted out on the Garden lawns, and more than 1,000 in the Domain copses, and others scattered through the Garden borders, would give at least 10,000 coniferous trees, to which permanent places have been assigned.

The kinds chosen for the various groups, as may be observed on reference to the plan, are the following: *Pinus Pinaster*, *P. maritima*, *P. Halepensis*, *P. pinea*, *P. Laricio*, *P. silvestris*, *P. Mughus*, *P. Abies*, *P. Larix*, *P. Cembra*, *P. Canariensis*, *P. Nordmanniana*, *P. excelsa*, *P. Smithiana*, *P. inops*, *P. Strobilus*, *P. Sabiniana*, *P. Douglasii*, *P. insignis*, *P. ponderosa*, *P. Jeffreyi*, *Sequoia Wellingtonia*, *Araucaria Cookii*, *A. Bidwillii*, *Callitris Gunnii*, *Cupressus glauca*, *C. torulosa*, *C. macrocarpa*, *C. Goveniana*, *C. Lawsoniana*. In their progress of growth the relative superiority and comparative value of all these trees may be watched.

It may justly be anticipated, that whenever, under the protecting shelter of the Wattle-Acacias, these young firs will have advanced to a stately size, that then a striking change in the aspect of this portion of the metropolitan landscape will take place; moreover, the Garden will then much less suffer from exposure and drought; and above all a pine park will be established, to which most of the city inhabitants will have a nearer and more easy access than to the Botanic Garden. We may hope, also, that after the lapse of a decennial period, seeds from this locality will become available in large masses, fresh for forest culture, a branch of State economy which demands to be initiated ere many more years pass away.

In the reserve opposite the Domain road, to 900 either Mediterranean or North American Oaks, many evergreen, and counting among them a large proportion of Cork Oaks, permanent positions have been assigned. *Quercus lancifolia* and *Q. Toza* were found the most rapid grown; then follow in celerity of growth *Q. Suber*, *Q. Sideroxylon*, *Q. confertifolia*, *Q. Mirbeckii*, *Q. Thomasii*, *Q. inversa*, *Q. heterophylla*.

The experimental ground ascending along the south-western side of the lagoon unfortunately suffered much from the last three floods, but may now be considered secure. It has during the last year been considerably extended and the means of irrigation have been applied.

None of the varieties of Cotton have matured any fruit on the spot, though at Yackandandah and other of the warmer parts of the colony it bore again this season.

Arrowroot and Ginger have shown a satisfactory yield, and the produce of Sweet Potato has been abundant. Among the kinds of Tobacco, the Connecticut variety has proved most prolific, and experiments instituted at Ipswich, in Queensland, with various kinds of tobacco from this Garden have yielded in the warmer climate there similar results. The Maryland tobacco also luxuriated. The Shiraz tobacco, cultivated already last year, evidently does not find in the vicinity of the metropolis that equality of a mild and humid mountain climate, under which, in the highlands of Persia, it advances to perfection, though undoubtedly in our moist and elevated mountain regions this variety would prosper. The Rheeafibre or Grasscloth plant has thriven fairly. For Coffee, as might be anticipated, the climate has proved here too variable, the temperature of our cool season being too low and that of the warm season too dry to secure a remunerative crop of this plant. By seeds, however, distributed from this establishment, the best variety of Mocha Coffee has been introduced, and now for plantation purposes been established in the Feejee group. But our experiments teach us, that even in the vicinity of Melbourne the Chinese Tea can be grown advantageously as far as climatic conditions are concerned. This plant should evidently in Victoria attract a more general attention of the agriculturist, as it is clearly destined to form, at no distant day, one of the commodities of indigenous culture. If the tea plant succeeds well in the changeable and often for lengths of time arid air of the city vicinity, how luxuriantly will not this important plant grow on the slopes of our wooded forest ranges, from which, on account of the difficulty of transport, cereal crops cannot advantageously be realized.

We stand evidently in need of a few small experimental gardens in the mild and humid parts of our mountain regions, where irrigation could easily be effected, and where seclusion from hot winds would be perfect.

Whether under the expenditure here as yet attending cultivation, as compared to that of India and China, tea produced in this colony can be brought to compete with that imported, remains to be demonstrated by facts; but it seems not unlikely that with our superior ingenuity in the application of apparatus and machinery the preparation of the tealeaves might be largely aided, while the engagement of labor, especially of the juvenile and infirm, might still be rendered remunerative for the gathering of the leaves. The cultivation of tea has certainly of late drawn into India a large amount of European capital and is there now most successfully pursued.

That the tea plant adopts itself to much diversified soil with facility has been borne out by all authentic information. Mr. Handley Sterndale observed the plant thriving on vegetable mould largely mixed with sand, on débris of metamorphic rocks, on trap, on clay slate, on mica slate, on mica rocks mixed with quartz, and even on ferruginous clay. In the mountains about Assam and elsewhere in India it ascends to 6,000 feet elevation. In Kohistan and the Punjab the tea shrubs are exposed to occasional snowfall and frosts, under which the plant only in a young seedling state, when it is unfit to cope with great atmospheric changes, succumbs. Where bush fires had destroyed tea plantations they have been observed to spring again after the advent of rain. Mr. Sterndale recommends the importation of tea seeds from Bengal whenever required on a large scale and of a superior kind.

In the local experimental gardens, the establishment of which suggests itself as desirable, and which perhaps could be connected with industrial schools, other plants of importance might be subjected to trials.

The first of such experimental gardens of a limited extent might be established in East Gipps Land, at Mount Macedon, and on the Murray River. Some preliminary measures to form a small Cinchona plantation in one of the mild glens of Mount Macedon have been initiated. How important it would prove to plant the warmer coast ranges of Australia and any other accessible parts with these precious trees, may be estimated by the circumstance, that Cinchona bark is brought in South America remuneratively from distances of several weeks' travels through the forests to the nearest mercantile dépôt.

Drawn under direction of *D^r F. Müller*
By *E. B. Heyne.*

By E. B. Heyne.

S T K I L D A R O A D

215. *Eucalyptus globulus* alternating with









North.

Swamps and Lagoons
surrounded by
Weeping Willows

AREA of Botanic Garden	52	0	5	50
" Lagoon in Bot. Garden	14	2	29	
" Bot. Garden Reserve	63	1	38	
" Govern. ^r House Reserve	176	2	24	
" North Ground of Bot. Garden	28	2	39	
" Proposed addition to North Ground	2	2	32	
	339	4	4	

Scale 4 Chains to an inch

REFERENCE.

- 
Iron Horse

Yan Yean Waterpumps

*Projected extension of
-Jan Yean Waterpumps*

Projected Remains

Position of Statues (projected)

Reckery

Earthenware glazed drainpipes

Land under spade cultivation

GEOLOGICAL REFERENCE.

- A. Alluvium. *Silt, Mud, Clay, Vegetable mould, &c.*
M. Miocene. *Tertiary Sand, Sandstone, Clay, Gravel, &c.*
V. Upper Volcanic. *Tertiary. Lava, Basalt, and other modern Volcanic Rocks.*
C. Palaeozoic. *Lower Silurian. Sandstones, Clay Shales, Slates.*

Lithographed at Geological Inst. Branch, Govt Printing Office Melbourne
by Geo. Newell.

A N D E R S O N

Hedge of Viburnum-finus and Prunus Lauro-Cerasus

Though in Australia we have only in the high coast ranges of Queensland and the northern part of New South Wales localities precisely corresponding in elevation, humidity and temperature to those parts of the Andes in which the most valued *Cinchonas* are indigenous, we may still entertain the hope, that what in Victoria we are missing in elevation of mountain tracts of mild atmosphere, would be recompensed by our lower mountain regions with their equability of a serene climate, and that therefore, in the Palm tree country of the eastern part of Gipps Land, or perhaps even in any of our extensive Fern tree gullies, the *Cinchona* would flourish. Plants of the two most important quinine yielding species, *Cinchona succirubra* and *Cinchona Calisaya*, are long since secured for the conservatories of this Garden, and if provision could be made for local experiments, such as I indicated, the number of plants could readily be increased by the ingenious method of layering, first adopted by Mr. Melvor in the Madras Presideney, a method unknown in South America, but which has yielded hundreds of thousands of plants within a short space of time to the many Indian *Cinchona* plantations.

In the annexed plan, which may serve as a general guide through the Garden and reserves, their prominent features have been delineated. The places allotted to eminently useful, rare or conspicuous plants have been marked with numbers, though such indications on a plan of so reduced dimensions can only be limited. Some of the projected improvements have also been pointed out on the plan. On the southern side of the lake 110 chiefly Australian *Acaciæ* have been congregated, since these plants are to us of special interest as belonging to a genus in species the richest of all in Australia. On the grass land at the adjoining rise a considerable number of different species of *Eucalyptus* are displayed, it being my aim to see the principal forms of this here so important genus of plants well represented in our Garden establishment. Of the Chinese white Mulberry tree a plantation has been formed near the Domain road, a continued demand of the leaves being experienced for sericulture, notwithstanding that the tree has been so extensively distributed from hence year after year.

The rockeries lately formed help to embellish many spots of the Garden. Of statues, as yet, nothing exists, however much they are desirable for enhancing the beauty of the spot. The pressure on the resources of a department so large, in its obligations so extensive and still under the process of formation, has hitherto been such, that calls for works of mere ornamentation were required to give widely way to those of utility.

Still it is hoped, that during the next year improvements may be effected in this direction, when simultaneously the acquisition will be needed of a number of fountains in the more conspicuous and open places. To provide for these works of art marked facilities exist in the fall of the ground, a jet of water for instance from one of the recently formed islands of the lagoon being propelled to the height of about sixty feet, by gravitation. Around the orchestre, and on other much traversed parts of the lawns, where it is difficult to maintain a verdant sward, three kinds of grasses of rigid and matted growth, *Stenotaphrum glabrum*, *Festuca distichophylla* and *Cynodon Dactylon*, have been adopted as a cover. *Scleranthus biflorus*, a sub-alpine plant of Victoria, forming a dense cushion-like turf, has here and there been chosen for edgings, though its slowness of growth will only allow its adoption gradually. The plant has withstood our summer heat much better than *Spergula pilifera*. Rose and Box edgings have of late here been adopted in preference to those of Chamomile and other plants involving in their maintenance much loss of labor. Some edging has been effected with basalt boulders.

The collection of fruit trees and vines, carefully named, has become gradually rich, and will be further extended, as it is of interest to watch and compare locally the respective merits of every kind.

The orchard thus formed may be transferred to the area of the Government House at a future period. The contents of the conservatories have much increased in variety; the selections of Ferns, *Cactææ* and other succulents being particularly rich. Of 700

species of here cultivated trees and shrubs seeds were collected in as large a quantity as available for interchanges. Of grasses the seeds of 170 kinds, of ferns the spores of 80 species were likewise harvested in the Garden. Of herbaceous plants 1,100 species were last summer under cultivation. The Queensland plants, grouped on one of the slopes of the grassy garden-valley, have endured well the vicissitudes of our climate. The hedge of *Pittosporum eugenioides* proves a feature equally interesting and ornamental, and as the plants can be raised with facility from seeds, and these are so readily accessible in New Zealand, this *Pittosporum*, as well as the allied *P. tenuifolium*, might be extensively employed for surrounding garden areas. *Noltea Africana* has recommended itself similarly for hedging. The call on our nurseries has been as extensive as ever for supplying plants to church and school reserves, cemeteries, and other public institutions. To Parliament House reserve lately 132 plants of pines several years old and 50 large sized bushes have been transferred. How extensively useful the establishment has been in dispersing superior trees and other plants over the country is evinced by the unparalleled instance, that alone of 40,000 Stone Pines raised at one time, and of 7,000 Deodar Cedars raised at another, barely enough were left for the use of the department after satisfying public demands. Under these circumstances, it cannot be otherwise than that the obligation of providing at so large a scale for the requirements of the public ground throughout the whole colony must be excessively burdensome to the department, and were the resources of the establishment to suffer reduction, it would be impossible to respond also in future, as I am still prepared, to all the claims for extensive supplies of plants or for furnishing almost daily cut flowers for fêtes of charities or other public demonstrations.

Nevertheless I regard the claims of the inhabitants of country districts, who cannot draw the same direct advantage from the Garden as metropolitan visitors, the claim to enjoy the indirect benefit of supplies for their public institutions from an establishment solely supported out of the general revenue as extremely just, and their wants have therefore continually and cheerfully been attended to. Thus, 209 institutions have been supplied during the past planting season. If the needful tending has been bestowed on all the plants since a series of years from hence distributed, the gifts conferred must be evident in all directions throughout the Victorian territory.

Seeds of such eminently useful plants as will bear a tropical climate have been provided for several of the northern settlements of Australia, as also for the expedition sent out by the ladies in search of Dr. Leichhardt. Among the seeds distributed were large quantities of various kinds of cotton, mainly received from the Manchester Association, who moreover very thoughtfully and liberally presented a very excellent cotton-gin to the department.

The distribution of plants to private gardens has been very limited, and in reciprocation only, pines and purchasable plants being excluded from the exchange.

Investigations into the causes of rust in cereals engaged my attention during a portion of last summer. The results of the enquiry, one which needs to be largely extended, were submitted in a report to the Board of Agriculture. For many experiments of a chemical or technological character, we are sadly in want of a laboratory and apparatus, requirements which unavoidably must be provided for, if such investigations as led to the recognition of the mercantile value of many oils, gums, resins, barks and other vegetable substances are to be continued, or anew to be initiated. The efforts to provide for the last great home Exhibition have been followed by many gratifying results. As a fact not very generally known, I may instance that from the resin of the Grass trees picric acid can be prepared, now so extensively used as a yellow dye, and on a basis of Indigo for green color. That unbounded treasures of our forests, available by dry distillation of their woods, remain dormant is but too apparent, and in the furtherance of native industry, and in affording new means for the employment of the colonists, the special application of technological chemistry should be brought to bear on this branch

of our resources. The extension of the Museum building stands also much in need, though the contemplated large middle room for the display of timber and other vegetable products, whether commercially or medicinally or technologically important, cannot be effected with the vote available during this year, since much of the outer fencing needs to be renewed, and additions to be made to several of the other buildings of the department.

Multifarious other engagements have rendered it impossible for me to resume field labors during the last season; but I cherish a hope to be able to complete the botanical survey of East Gipps Land during the coming summer, a part of our territory not even geographically well explored. We may presume that on the forest mountains and in the jungle-glens between the Genoa River and Snowy River the discovery of plants still new will reward the search, and that the precise southern limits of many species from the warmer parts of East Australia will be ascertained. Mr. Dallachy, under considerable disadvantages, and occasionally not without imminent danger arising from the hostility of the natives, continues zealously to collect in the densely wooded humid ranges about Rockingham's Bay, and he is requested to endeavor to reach the crests of the Bellenden Ker Range, the highest mountain tract of intertropical Australia, and the most promising which remains to be explored. Indeed, we may presume that whenever the high hills of North-East Australia have been scrutinized by an experienced traveller, not many hundred new plants (if Fungi are excluded) will be left to be discovered throughout the wide tracts of this continent. The Fungus Flora, however, will entail special observations for many years.

A brisk interchange is maintained with kindred institutions abroad and in the colonies, as will be manifest from the subjoined list of contributions, many of which are exclusively donations, and evince the continued generous interest which the Garden and Museum experienced. From many mercantile firms we have enjoyed free transit for consignments, and the aid rendered in this direction by the Peninsular and Oriental Steam Navigation Company is beyond all praise. Among the various and important plants recently acquired are the Colchicum, the Inca Maize (obtained from Marshal Santa Cruz, Peruvian Ambassador in Paris), various new varieties of fruits, the Valonia Oak, Tragacanth plant, Tanner's Sumach, Senna, the American Percimoon (obtained through the kindness of Consul Blanchard), the Chinese Tallow tree, the Jalap plant (secured by L. A. Bernays, Esq.), the edible Cluster Fig tree of North-East Australia, Pistacia Terebinthus, and many others numbered in the accompanying plan.

Of the West Australian Mahagoni tree, which yields a wood so completely resisting decay in sea water, a large number of plants are in our nurseries.

Mr. G. Coppin has most attentively arranged for the introduction of some of the hardy Vines of North America, the cultivation of which has of late attracted so much attention.

Future more extended border culture cannot be attempted with the means at our command, though to the tree plantations on our lawns may be added, and the variety of plants cultivated on our borders be vastly increased from extratropical and subtropical countries. Contending with great sterility of soil and with the growth of weeds, active throughout the year, it would be vain to attempt maintaining a larger area neatly under cultivation. The proportions of ground under spade culture, and that occupied by arboreta, are indicated on the plan.

For the further embellishment of the existing borders we might prominently effect large introductions of South African plants through a special emissary, since no country of the world would more abundantly yield plants of ornament calculated to prosper in this climate. As yet we have of the immense number of Pelargonium, Mesembryanthemum, Ericæ, Oxalides, Phyllis, Stapelias, Aloes, Helichrysa, leguminous, iridaceous plants and others indigenous to South Africa, comparatively but a limited number; most of these would

produce here seeds in cultivation and afford the means of interchanges still more extended than even those hitherto carried on.

I may avail myself of this opportunity to submit my views how, at a future period, the best access could be given to the Garden when the palace of the Governor shall have been raised at the site reserved in the early days of the colony for this purpose, and the present drive from the City bridge will not be any longer available for general traffic. If the path formed already along the base of the ridges facing the Yarra was so far widened as to be transformed into a carriage drive, then a most pleasant road would be opened without any encroachment on the seclusion of the Government House domain. By widening the causeway which separates the Yarra from the lake, we might extend the river drive through the Garden area, and therewith one of the most delightful passages for vehicles could be established. If a carriage bridge could be extended over the Yarra abreast of Jolimont road the access to the Gardens would become perfect.

The Yarra foot bridge, though it suffered so much from the three last devastating floods, after the temporary repair effected by the order of the Board of Land and Works, will serve for traffic until the beautiful and lasting iron girder structure now provided by the Government shall have been completed.

In the literary branch of the department four works emanated within the last year. To these I may be permitted briefly to allude. A quarto volume of lithograms of Victorian plants embraces sixty-six plates, illustrative of such species not delineated before as exhibit more prominently characters of orders and genera of our indigenous vegetation. The analytical details are given extensively; hence by the use of this volume, the student will not only without special reading be readily initiated into the terminology of botanical science, but be enabled also to start from some leading point for any unaided enquiry into the vegetation which may surround him, especially since other publications, some specially applied to the Flora of this country, exist to facilitate his researches. The series of these lithograms is under continuation. Of the *Fragmenta Phytographiæ Australiæ*, the fourth volume has appeared, mainly replete with descriptions of plants not previously known to science. It is probable, that the fifth volume, of which a considerable portion has been printed, and in which, among other grand features in the Australian empire of plants, the lofty Alexandra palm and several new fern trees are rendered known, can be issued before the end of the year. A series of drawings of mosses, published also within the year, will probably attract the attention of a number of observers to the delicate forms of these readily preserved objects for microscopic investigation, the local study of which presents especial charm so long as we are far from being fully acquainted with the moss-flora of this country. A small volume on the plants of the Chatham Islands, elaborated in the latter part of last year, is based on material presented to the museum of our botanical department by W. T. L. Travers, Esq., of Nelson, N.Z., with a special request for the elucidation of these plants. Though this material afforded actually but a limited number of species, of the existence of which we had no previous knowledge, it was well deserving of special elucidation, since the little Chatham group was formerly almost unexplored regarding its vegetable productions. At the time when the plants of the Chatham Islands were received here and rendered known, a volume also on the plants of New Zealand, written by Dr. Jos. Hooker, passed in London through the press, for which volume Mr. Travers's collections became not timely accessible. But while the new researches on the New Zealand plants were still unknown to me, I purposely gave simultaneous publicity to my own observations, in order that the independent views of two observers on a number of identical plants might subsequently be compared, the expression of disparity of opinion always tending largely to elicit truth. How far our observations are concordant may be demonstrated by the fact, that Dr. Hooker admits not less than seventeen New Zealandian species of the genus *Epilobium*, while I recognize but one, and that what I consider varieties of one polymorphous *Veronica* is moulded by the illustrious author of the New

Zealand Flora into nineteen specific forms. That through want of extensive field studies untenable limits are assigned to a vast number of supposed specific forms admits of no doubt whatever, and it is equally evident that the vain attempt to draw lines of specific demarcation between mere varieties or races, hitherto not sufficiently understood in their relation to allied forms of organic life, has largely tended to suggest the theory of transmutation, a doctrine against which in the treatise under consideration I have expressed though cursory still unequivocally a dissenting opinion. Of the second volume of Victorian plants, the greater portion descriptive of the order of Leguminosæ has been printed. But the continuation of this work, commenced on a more comprehensive scale than almost any other existing of a kindred tendency, has for a while been suspended, with a view of giving precedence to a more concise publication, brought out under the aid of our botanical office, by Mr. G. Bentham, the President of the Linnean Society. The expressions of opinions given by this great phytographer in the issue of this work cannot be otherwise than of advantage in the elaboration of the future volumes to be devoted to the "plants of Victoria." For the two volumes hitherto written, and the third under preparation, on the universal vegetation of Australia, comprising all Thalamifloræ and with exception of Compositæ all Calycifloræ hitherto found in Australia, 468 fascicles of plants from the Melbourne Botanical Museum have successively been forwarded for temporary perusal and consultation to Kew. For the concluding portion of the third volume 61 fascicles of Compositæ are prepared. On reference to Mr. Bentham's work, it will be observed that the united material, which in Australia through my researches since 1847 was brought together, is larger than the collections which since the time of Sir Jos. Banks's voyage with Capt. Cook accumulated in Britain, if mine deposited there are subtracted. Seizing on every opportunity which presents itself to add to our store of prepared plants, and maintaining continually one collector in the field, I am almost constantly augmenting the riches of our collections. The whole herbarium of this establishment may be estimated as comprising about 286,000 specimens; the number of extra-Australian individual plants exceeds somewhat those of the Australian portion. Both divisions are kept separate, for the sake of affording increased facility for working with the Australian specimens. How far the formation and elucidation of these collections have already exercised an influence on the process of rendering descriptively known the plants of the Australian continent may be learned, in a retrospective view, from the exposition annexed, according to which, by my local researches, more than 300 genera either not indicated before or specifically not elucidated, were for the first time introduced into the systematic arrangement of the vegetation of this great part of the globe; 95 of these represent generic types novel to science.

Genera not previously known among described Australian plants: *Caltha*, *Myosurus*, *Tetracera*, *Stephania*, *Drimys*, *Sisymbrium* (*Blennodia*), *Capsella*, *Turritis*, *Busbeckia*, *Polygala*, *Xanthophyllum*, *Hugonia*, *Scolopia*, *Brackenridgea*, *Adansonia*, *Helicteres*, *Melochia*, *Riedleya*, *Melhania*, *Waltheria*, *Corchorus*, *Triumfetta*, *Grewia*, *Sloanea*, *Abelmoschus*, *Gossypium*, *Pavonia*, *Urena*, *Lagunaria*, *Bergia*, *Xanthoxylon*, *Euodia*, *Melicope*, *Ryssopterys*, *Atalaya*, *Ratonia*, *Harpullia*, *Nephelium*, *Cardiospermum*, *Ailantus*, *Turraea*, *Ximenia*, *Villaresia*, *Byronia*, *Erythroxylon*, *Sagina*, *Polycarpæa*, *Glinus*, *Mollugo*, *Trianthema*, *Aizoon*, *Sesuvium*, *Tetragonia*, *Hippocratea*, *Gouania*, *Celastrus*, *Euonymus*, *Canarium*, *Rhus*, *Parinarium*, *Homalium*, *Zizyphus*, *Melanthesa*, *Baloghia*, *Mallotus* (*Rottlera*), *Macaranga* (*Mappa*), *Bridelia*, *Acalypha*, *Tragia*, *Hemicyclia*, *Andrachne*, *Excoecaria*, *Aleurites*, *Ceratophyllum*, *Weinmannia*, *Geissois*, *Donatia*, *Argophyllum*, *Jussiaea*, *Ludwigia*, *Annamia*, *Ameletia*, *Ceriops*, *Bryoniopsis*, *Muckia*, *Lagunaria*, *Trichosanthes*, *Luffa*, *Zehneria*, *Memecylon*, *Metrosideros*, *Syzygium*, *Cathartocarpus*, *Calpurnia*, *Westonia*, *Adenanthera*, *Agati*, *Sesbania*, *Æschynomene*, *Lourea*, *Cajanus*, *Rhynchosia*, *Tephrosia*, *Erythrophlæum*, *Pterolobium*, *Viscum*, *Rhytidandra*, *Paratropia*, *Seseli*, *Pozoa*, *Crantzia*, *Ligusticum* (*Gingidium*), *Guetarda*, *Polyphragmon*, *Gardenia*,

Ixora, *Knoxia*, *Timonius*, *Cœlospermum*, *Spermacoce*, *Hedyotis*, *Nertera*, *Sarcocephalus*, *Eupatorium*, *Ageratum*, *Berthelotia*, *Pluchea*, *Adenostemma*, *Antennaria*, *Abrotanella* (*Trineuron*), *Spilanthus*, *Eclipta*, *Enhydra*, *Gynura*, *Bidens*, *Haplotaxis*, *Centratherum*, *Grammatotheca*, *Symplocos*, *Bidaria*, *Gongronema*, *Alstonia*, *Cerbera*, *Lactaria*, *Melodinus*, *Chilocarpus*, *Mitreola*, *Fagraea*, *Geniostoma*, *Adhatoda*, *Dicliptera*, *Ebermayeria*, *Dipteracanthus*, *Adenosma*, *Bonnaya*, *Rhamphicarpa*, *Peplidium*, *Bæa*, *Hydrolea*, *Lycium*, *Datura*, *Canscora*, *Coldenia*, *Echinosperrum*, *Ocimum*, *Pogostemon*, *Ligustrum*, *Ardisia*, *Choripetalum*, *Maesa*, *Helicia*, *Echinopsilon*, *Ærva*, *Psilotrichum*, *Amarantus*, *Pouzolsia*, *Potomorphe*, *Drymispermum*, *Elæagnus*, *Ephedra*, *Ouvirandra*, *Aponogeton*, *Hydrocharis*, *Hydrilla* (*Udora*), *Ruppia*, *Cyanothis*, *Polia*, *Oberonia*, *Saccolabium*, *Pholidota*, *Bolbophyllum*, *Erythrochlis*, *Phajus*, *Musa*, *Typhonium*, *Costus*, *Zingiber*, *Alpinia*, *Caryota*, *Cocus*, *Freycinetia*, *Oryza*, *Polypogon*, *Sclerachne*, *Ceratopteris*, *Hypolytrum*, *Antrophyum*, *Meniscium*, *Helminthostachys*, *Cyathea*.

The genera of Mosses and Algae first rendered known through our collections by the monographic labors of other authors have been omitted.

New Genera: *Ancana*, *Fitzalanina*, *Wilkia*, *Palmeria*, *Tristichocalyx*, *Selwynia*, *Sarcopetalum*, *Hymenosporum*, *Cadellia*, *Emblugia*, *Apophyllum*, *Streptothamnus*, *Howittia*, *Lysiosepalum*, *Hannafordia*, *Dicarpidium*, *Brombya*, *Halfordia*, *Coatesia*, *Bosistoa*, *Distichostemon*, *Owenia*, *Hearnia*, *Monococcus*, *Emmenosperma*, *Hedraianthera*, *Neorœpera*, *Petalostigma*, *Synostemon*, *Gillbeea*, *Cuttsia*, *Macropteranthus*, *Gunnia*, *Diplobolium*, *Barklya*, *Archidendron*, *Nematophyllum*, *Osbornia*, *Lysicarpus*, *Phynatocarpus*, *Atkinsonia*, *Dichopetalum*, *Pogonolobus*, *Hodgkinsonia*, *Mackinlaya*, *Nothocittus* (*N. Irvingii*, F. M.), *Polycalymma*, *Eriochlamys*, *Trichanthodium*, *Minuranthus*, *Pleuropappus*, *Lachnothalamus*, *Lamprochlaena*, *Elachopappus*, *Cyathopappus*, *Oliganthemum*, *Hæckeria*, *Spiropodium*, *Cheiroloma*, *Ixiochlamys*, *Ethuliopsis*, *Elachanthus*, *Diodontium*, *Pentalepis*, *Acomis*, *Acanthocladium*, *Kippistia*, *Colcocomia*, *Wittsteinia*, *Michiea*, *Earlia*, *Maccoya*, *Denisonia*, *Newcastlia*, *Bunnya*, *Duttonia*, *Sentis*, *Haussmannia*, *Faradaya*, *Bulweria*, *Rhyncharrhena*, *Cardwellia*, *Arthrotrichum*, *Babbagia*, *Sclerochlamys*, *Osteocarpum*, *Disocarpum*, *Octoclinis*, *Maundia*, *Arthrochilus*, *Agrostocrinum*, *Hodgsoniella*, *Petermannia*, *Reedia*, *Juncella*.

The definition of about 20 additional genera, either quite unknown or additional to Australian generic forms, is reserved for the fifth volume of the *Fragmenta*.

The existence in Australia of fifteen ordinal or subordinal groups of plants, either not noticed before, or without specific limitation of their Australian representatives only indicated, was elucidated by the researches of this office. These groups are *Oclmaceæ*, *Erythroxyleæ*, *Hippocrateæ*, *Brexiaceæ*, *Ilicineæ*, *Homalineæ*, *Ceratophylleæ*, *Alangiaceæ*, *Styraceæ*, *Vacciniceæ*, *Hydrophyllææ*, *Elæagneæ*, *Ephedreæ*, *Musaceæ*, *Pontederiaceæ*. To these might be added *Trithuriaceæ*, a group altogether here for the first time defined, and perhaps also *Orobanchææ*, inasmuch as *Orobanche cernua* has become naturalized since a series of years in widely distant parts of South and West Australia. Further phytological investigations of North-East Australia will undoubtedly add to this series members of other orders, especially of Indian type, as yet not recognized in the great complex of forms of vegetable life in this part of the globe.

Hitherto approximately 2,000 of the 10,000 plants, which, with exclusion of Fungi, constitute the total flora of Australia, received their systematic position and exact appellation by the independent investigations of this department. If for our phytological museum, which is already unique in the southern hemisphere, additionally the private herbarium of one of our leading botanical celebrities could be secured, a herbarium rich in autographical samples of such plants as were connected with the writings of authors published during the first decennial periods of this century, we would then possess a botanical institution second to but very few of the great metropolitan state herbaria of Europe, and excelling all in its Australian division.

The botanical library, which I had formed since a series of years, has now passed over permanently to the department. It comprises predominantly such a selection of books as are needed for local investigations into our flora. Had these works been scattered it would have been difficult, expensive and tedious to restore a similar collection. It consists of 1,086, to a large extent costly, volumes, and of many hundred smaller publications. A brief catalogue is appended to this document.

Though it involved many years' toilsome exertions as well in the field as in the study to advance our botanical department to its present position, it remains gratifying to reflect, that the labors have not been in vain, and that for independent phytographic researches now in Australia more extensive means and greater facilities exist than in many of the metropolitan institutions of an analogous tendency in Europe.

I have the honor to be, Sir,

Your most obedient Servant,

FERD. MUELLER, M.D., F.R.S.,

*Government Botanist for Victoria,
and Director of the Botanic Garden of Melbourne.*

The Honorable the Chief Secretary,
&c., &c., &c.

SEEDS OR PLANTS OF SPECIAL VALUE OR INTEREST WHICH WERE RECEIVED
FROM THE FOLLOWING DONORS SINCE THE ISSUE OF THE LAST REPORT.

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From the Agricultural and Horticultural Society, Punjaub, large assortment of seeds, especially Indian Pines.
From Professor Dr. Th. Anderson, Calcutta, large collection of pine and other seeds of the Indian Highlands, also Wardian cases with tropical plants.
From His Excellency Sir Henry Barkly, Mauritius, several Wardian cases containing tropical plants.
From W. Blanchard, Esq., Consul for the United States of America in Melbourne, seeds of eminently valuable North American forest trees.
From the Botanical Gardens of Adelaide, Berlin, Brisbane, Calcutta, Capetown, Copenhagen, Hamburg, Hobarton, Lyon, Montpellier, Moscow, Nizza, Otago, Palermo, Paris, Petersburg, Sydney and Vienna, considerable collections of seeds.
From the British Consul at Arica, seeds of the Peruvian tree-cotton.
From J. H. Butler, Esq., Calcutta, numerous Wardian cases with Indian plants.
From His Excellency Sir William Denison, Madras, Wardian cases with Cinchona plants and Orchids.
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From Sir William Hooker, Kew, large collection of seeds and some Wardian cases with ornamental plants.
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From Professor Dr. Philipp, Santiago, Wardian case with Peruvian plants.
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From W. A. Virgoe, Esq., Brighton, donation of spotted Aroids and other ornamental stove plants.
From Mr. W. Walker, San Francisco, seeds of Californian Pines.
From Edw. Wilson, Esq., numerous consignments of seeds.
From Mr. H. Winterstein, Alexandria, large collections of seeds of useful or ornamental plants.

Total number of Wardian cases received, 43.

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INDEX OF EMINENTLY VALUABLE, CONSPICUOUS OR RARE PLANTS SPECIALLY
 NUMBERED ON THE PLAN.

- | | | |
|-------------------------------|---------------------------------|--------------------------------|
| 1. Photinia serrulata. | 56. Cordyline Australis. | 111. Castanea vesca. |
| 2. Hovenia dulcis. | 57. Hymenanthera Banksii. | 112. Brachychiton acerifolium. |
| 3. Leucadendron argenteum. | 58. Yucca gloriosa. | 113. Bromelia silvestris. |
| 4. Eucephalartos Denisonii. | 59. Doryanthes exelsa. | 114. Alectryon excelsum. |
| 5. Panax papyrifer. | 60. Sorbus aucuparia. | 115. Royenia lucida. |
| 6. Pittosporum Colensoi. | 61. Wellingtonia gigantea. | 116. Celastrus scandens. |
| 7. Ficus Indica. | 62. Pittosporum bicolor. | 117. Berberis aristata. |
| 8. Quercus lanceifolia. | 63. Ficus macrophylla. | 118. Mahonia Aquifolium. |
| 9. Quercus Robur Thomasii. | 64. Podocarpus elata. | 119. Callitris verrucosa. |
| 10. Ulmus Chineusis. | 65. Laurus nobilis. | 120. Quercus rubra. |
| 11. Pittosporum phillyroides. | 66. Psidium pyrifera. | 121. Eucalyptus corynocalyx. |
| 12. Eremophila longifolia. | 67. Carya amara. | 122. Quercus coccinea. |
| 13. Camellia Japonica. | 68. Flindersia Australis. | 123. Angophora lanceolata. |
| 14. Cryptomeria Japonica. | 69. Acacia Julibrissin. | 124. Pericampylus incanus. |
| 15. Eucalyptus occidentalis. | 70. Eucalyptus cornuta. | 125. Grevillea Hillii. |
| 16. Eucephalartos Preissii. | 71. Eucalyptus Mahagoni. | 126. Fraxinus Ornus. |
| 17. Panax dendroides. | 72. Aesculus Pavia. | 127. Quercus Egilops. |
| 18. Eriobotrya Japonica. | 73. Pinus longifolia. | 128. Quercus alba. |
| 19. Virgilia Capensis. | 74. Boronia megastigma. | 129. Brachychiton Delabeechei. |
| 20. Notelaea ligustrina. | 75. Aberia Caffra. | 130. Tetragonia implexicoma. |
| 21. Hakea Baxteri. | 76. Prunus spinosa. | 131. Disemina coccinea. |
| 22. Aemone floribunda. | 77. Canothus thyrsiflorus. | 132. Castanospermum Australe. |
| 23. Citrus medica. | 78. Leucadendron grandiflorum. | 133. Livistonia Australis. |
| 24. Acacia melauoxylon. | 79. Eucephalartos Altensteini. | 134. Melaleuca stypheloides. |
| 25. Hakea purpurea. | 80. Eucephalartos Lehmannii. | 135. Melaleuca genistifolia. |
| 26. Eremophila bignoniiflora. | 81. Eucephalartos spiralis. | 136. Ficus elastica. |
| 27. Podocarpus Totara. | 82. Hedera crassifolia. | 137. Eugenia Ugii. |
| 28. Exocarpus cupressiformis. | 83. Coffea Arabica. | 138. Jambosa Australis. |
| 29. Araucaria Bidwillii. | 84. Cinchona succirubra. | 139. Hakea Victoriae. |
| 30. Pircunia dioica. | 85. Daerydium Franklino. | 140. Vitis Baudiniana. |
| 31. Smilax aspera. | 86. Ficus Australis. | 141. Agonis flexuosa. |
| 32. Musa Chinensis. | 87. Azalea Indica. | 142. Aleurites triloba. |
| 33. Myrtus communis. | 88. Opuntia Tuna. | 143. Exocarpus pendula. |
| 34. Hakea cucullata. | 89. Opuntia coccinellifera. | 144. Elaeocarpus cyauens. |
| 35. Arbutus Unedo. | 90. Eucalyptus tetragona. | 145. Xanthorrhoea Australis. |
| 36. Araucaria exelsa. | 91. Widdringtonia juniperoides. | 146. Callitris quadrivalvis. |
| 37. Araucaria Cunninghamii. | 92. Aristolochia Siphon. | 147. Arundo conspicua. |
| 38. Musa paradisiaca. | 93. Botryodendron latifolium. | 148. Olearia Traversii. |
| 39. Cupressus torulosa. | 94. Quercus glabra. | 149. Callitris Macleayana. |
| 40. Pinus Deodara. | 95. Acacia Farnesiana. | 150. Dammara robusta. |
| 41. Laurus Camphora. | 96. Corynocarpus laevigatus. | 151. Syncarpia laurifolia. |
| 42. Cedrela Taona. | 97. Callitris cupressiformis. | 152. Arundo Gynierum. |
| 43. Ceratonia Siliqua. | 98. Arundo Donax variegata. | 153. Callitris Actinostrobos. |
| 44. Phoenix dactylifera. | 99. Olearia argophylla. | 154. Amyris terebinthifolia. |
| 45. Morus nigra. | 100. Hakea cucullata. | 155. Pinus palustris. |
| 46. Eucalyptus rostrata. | 101. Wistaria Chinensis. | 156. Banksia grandis. |
| 47. Hakea eucalyptoides. | 102. Maclura aurantiaca. | 157. Eucalyptus citriodora. |
| 48. Bambusa arundinacea. | 103. Melicytus ramiflorus. | 158. Grevillea segmentosa. |
| 49. Protea mellifera. | 104. Duboisia myoporoides. | 159. Fagus Cunninghamii. |
| 50. Erechthium spicata. | 105. Araucaria imbricata. | 160. Rubus fruticosus. |
| 51. Musa Banksii. | 106. Strelitzia augusta. | 161. Panax elegans. |
| 52. Liquidambar styraciflua. | 107. Phoenix silvestris. | 162. Broussonetia papyrifera. |
| 53. Juglans nigra. | 108. Baloghia lucida. | 163. Morus rubra. |
| 54. Musa textilis. | 109. Dicksonia antarctica. | 164. Coccoloba platyclada. |
| 55. Quercus coccifera. | 110. Alsophila Australis. | 165. Populus Canadensis. |

KEY TO THE ORDERS OF PLANTS REPRESENTED IN THE CLASS GROUND.

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| <p><i>Thalamifloræ.</i></p> <ol style="list-style-type: none"> 1. Ranunculaceæ. 2. Dilleniaceæ, Menispermææ. 3. Magnoliaceæ. 4. Sapindaceæ. 5. Cistineæ, Papaveraceæ. 6. Buettneriaceæ, Sterculiaceæ. 7. Malvaceæ. 8. Berberideæ, Oxalideæ. 9. Geraniaceæ. 10. Polygalææ. 11. Ternstroemiaceæ, Hypericineæ. 12. Aurantiacææ. 13. Rutaceæ. 14. Pittosporææ. 15. Caryophylleæ, Elæocarpeæ. 16. Cruciferaæ. 17. Violarineæ, Tamariscineæ. 18. Tiliaceæ, Frankeniaceæ. 19. Acerineæ. 20. Meliaceæ. <p><i>Calycifloræ.</i></p> <ol style="list-style-type: none"> 21. Philadelphææ, Calycantheæ. 22-26. Rosaceæ. | <ol style="list-style-type: none"> 27. Saxifrageæ, Lythrarieæ. 28. Haloragææ, Onagreaæ. 29. Rubiaceæ. 30. Euphorbiaceæ. 31. Ribesiaceæ. 32. Dipsaceæ. 33. Ficoideæ. 34-36. Compositæ. 37-39. Myrtaceæ. 40. Rhamnaceæ. 41-43. Papilionaceæ. 44. Mimoseæ. 45. Cæsalpinææ. 46. Umbelliferææ, Araliaceææ. 47. Caprifoliaceæ, Passifloreææ. <p><i>Corollifloræ.</i></p> <ol style="list-style-type: none"> 48. Aselepiadææ. 49. Apocynææ. 50. Jasminææ. 51. Bignoniaceæ. 52. Gentianeæ, Loganiaceææ. 53. Campanulaceæ, Goodeniaceææ. 54. Ericineæ, Epacrideææ. 55-56. Ilicineæ. 57-58. Oleaceæ. | <ol style="list-style-type: none"> 59. Ebenaceæ. 60-62. Solanææ. 63. Myrsineæ. 64. Scrophularineæ. 65. Myoporineæ. 66. Acanthaceææ. 67. Plumbagineææ. 68. Verbenaceææ. 69. Labiatææ. 70. Plantagineææ, Primulaceææ. 71. Borragineææ. 72. Polcmoniaceææ. <p><i>Monochlamydeæ.</i></p> <ol style="list-style-type: none"> 73-80. Coniferaæ. 81. Cycadeææ. 82. Thymeleææ. 83. Nyctagineææ. 84. Laurineææ. 85. Casuarineææ. 86. Urticeææ. 87-88. Protacæææ. 89. Salicineææ. 90. Polygoneææ, Elæagneææ. 91. Cupuliferææ. 92. Moreææ. |
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